

# Chapter A1: Introduction and Overview

## INTRODUCTION

EPA is proposing regulations implementing Section 316(b) of the Clean Water Act (CWA) for existing facilities with a design cooling water intake flow of 50 million gallons per day (MGD) or greater (33 U.S.C. 1326(b)). The Proposed Section 316(b) Phase II Existing Facilities Rule would establish national technology-based performance requirements applicable to the location, design, construction, and capacity of cooling water intake structures (CWIS) at existing facilities. The proposed national requirements would establish the best technology available (BTA) to minimize the adverse environmental impact (AEI) associated with the use of these structures. CWIS may cause AEI through several means, including impingement (where fish and other aquatic life are trapped on equipment at the entrance to CWIS) and entrainment (where aquatic organisms, eggs, and larvae are taken into the cooling system, passed through the heat exchanger, and then discharged back into the source water body).

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## A1-1 SCOPE OF THE PROPOSED RULE

The proposed Phase II rule applies to existing power producing facilities that meet all of the following conditions:

They use a cooling water intake structure or structures, or obtain cooling water by any sort of contract or arrangement with an independent supplier who has a cooling water intake structure; or their cooling water intake structure(s) withdraw(s) cooling water from waters of the U.S., and at least twenty-five (25) percent of the water withdrawn is used for contact or non-contact cooling purposes;

- ▶ They have an NPDES permit or are required to obtain one; and
- ▶ They have a design intake flow of 50 MGD or greater.

The proposed Phase II rule also covers substantial additions or modifications to operations undertaken at such facilities. While all facilities that meet these criteria are subject to the regulation, this Economic and Benefit Analysis (EBA) focuses on 539 utility and non-utility steam electric power generating facilities identified in EPA's 2000 Section 316(b) Industry Survey as being potentially covered by this proposed rule. These 539 facilities represent 550 facilities nation-wide.<sup>1</sup>

The proposed Phase II rule does not cover (1) new steam electric power generating facilities, (2) new manufacturing facilities, (3) existing steam electric power generating facilities with a design intake flow of less than 50 MGD, and (4) existing manufacturing facilities. The Final Section 316(b) New Facility Rule (Phase I), which EPA promulgated in November 2001, covered new steam electric power generating facilities and new manufacturing facilities. Existing steam electric power generating facilities with a design intake flow of less than 50 MGD and existing manufacturing facilities will be addressed by a separate rule (Phase III).

<sup>1</sup> EPA applied sample weights to the 539 facilities to account for non-sampled facilities and facilities that did not respond to the survey. For more information on EPA's 2000 Section 316(b) Industry Survey, please refer to the Information Collection Request (U.S. EPA, 2000).

## A1-2 DEFINITIONS OF KEY CONCEPTS

This EBA presents EPA's analyses of costs, benefits, and potential economic impacts as a result of the proposed Phase II rule. In addition to important economic concepts, which will be presented in the following chapters, understanding this document requires familiarity with a few key concepts applicable to CWA section 316(b) and this regulation. This section defines these key concepts.

- ▶ **Capacity Utilization Rate:** The ratio between the average annual net generation of the facility (in MWh) and the total net capability of the facility (in MW) multiplied by the number of available hours during a year. The average annual generation must be measured over a five year period (if available) of representative operating conditions.
- ▶ **Cooling Water Intake Structure (CWIS):** The total physical structure and any associated constructed waterways used to withdraw water from waters of the U.S. The CWIS extends from the point at which water is withdrawn from the surface water source up to, and including, the intake pumps.
- ▶ **Design Intake Flow:** The value assigned (during the facility's design) to the total volume of water withdrawn from a source waterbody over a specific time period.
- ▶ **Entrainment:** The incorporation of all life stages of aquatic organisms with intake water flow entering and passing through a CWIS and into a cooling water system (e.g., fish and shellfish).
- ▶ **Existing Facility:** Existing facility means any facility that commenced construction before January 17, 2002; and
  - (1) any modification of such a facility;
  - (2) any addition of a unit at such a facility for purposes of the same industrial operation;
  - (3) any addition of a unit at such a facility for purposes of a different industrial operation, if the additional unit uses an existing CWIS and the design capacity of the intake structure is not increased; or
  - (4) any facility constructed in place of such a facility, if the newly constructed facility uses an existing CWIS whose design intake flow is not increased to accommodate the intake of additional cooling water.
- ▶ **Impingement:** The entrapment of all life stages of aquatic organisms on the outer part of an intake structure or against a screening device during periods of intake water withdrawal (e.g., fish, shellfish, turtles, birds, seals, etc.).
- ▶ **Phase II Existing Facility:** An existing facility, as defined above, that also meets the following requirements:
  - (1) is a point source that uses or proposes to use a CWIS; and
  - (2) both generates and transmits electric power, or generates electric power but sells it to another entity for transmission; and
  - (3) has at least one CWIS that uses at least 25 percent of the water it withdraws for cooling purposes; and
  - (4) has a design intake flow of 50 MGD or more.

The category of facilities that would meet the proposed CWIS criteria for Phase II existing facilities are electric power generation utilities and nonutility power producers, including cogeneration facilities.

## A1-3 SUMMARY OF THE PROPOSED RULE

The Proposed Section 316(b) Phase II Existing Facilities Rule would establish national standards applicable to the location, design, construction, and capacity of CWIS at Phase II existing facilities to minimize AEI. The requirements of the proposed Phase II rule reflect the BTA for minimizing AEI associated with the CWIS based primarily on source water body type and the amount of cooling water withdrawn by a facility. A facility may choose one of three compliance alternatives for meeting BTA requirements under this proposed rule:

- ▶ **Compliance Alternative 1** allows a facility to demonstrate that its existing CWIS design and construction technologies, operational measures, or restoration measures currently meet the specified performance standards.
- ▶ **Compliance Alternative 2** allows a facility to select and implement design and construction technologies, operational measures, or restoration measures that satisfy the specified performance standards.
- ▶ **Compliance Alternative 3** allows a facility to demonstrate that it meets specified compliance cost criteria and obtain a site-specific determination of BTA for minimizing AEI.

### A1-3.1 Proposed Performance Standards

The proposed Phase II performance standards are based on several key factors, including CWIS intake capacity, facility capacity utilization rate, source waterbody category, and percentage of the source water being withdrawn. The proposed rule would establish performance standards for three groups of waterbody categories. These include (1) tidal rivers, estuaries, oceans, and the Great Lakes; (2) lakes (other than the Great Lakes) and reservoirs; and (3) freshwater rivers or streams. The performance standards include the following:

- ▶ **Capacity** – Any Phase II facility that reduces its intake capacity to a level commensurate with that which can be achieved by a closed cycle, recirculating cooling system is not subject to further requirements under the proposed rule. This is applicable to facilities with CWIS located in any of the waterbody categories.
- ▶ **Capacity Utilization Rate** – Any Phase II facility with a capacity utilization rate that is less than 15 percent must reduce impingement mortality of all life stages of fish and shell fish by 80 to 95 percent from the calculation baseline, regardless of proportional flow level of the facility.
- ▶ **Source Waterbody Category/Proportion of Waterbody** – These requirements vary according the combination of waterbody category and percentage of the waterbody withdrawn:
  - ▶ Facilities with one or more CWIS located in an estuary, tidal river, ocean, or Great Lake must reduce impingement mortality of all life stages of fish and shell fish by 80 to 95 percent from the calculation baseline, and it must reduce entrainment of all life stages of fish and shellfish by 60 to 90 percent from the calculation baseline;
  - ▶ Facilities with one or more CWIS located in a freshwater river or stream must reduce impingement mortality of all life stages of fish and shell fish by 80 to 95 percent from the calculation baseline and must reduce entrainment of all life stages of fish and shellfish by 60 to 90 percent from the calculation baseline if they have a design intake flow greater than 5 percent of mean annual flow;
  - ▶ Facilities with one or more CWIS located in a freshwater river or stream must reduce impingement mortality of all life stages of fish and shell fish by 80 to 95 percent from the calculation baseline if they have a design intake flow that is 5 percent or less of mean annual flow;
  - ▶ Facilities with one or more CWIS located in a lake or reservoir must reduce impingement mortality of all life stages of fish and shell fish by 80 to 95 percent from the calculation baseline. In addition, if such facilities propose to increase design intake flow they must not disrupt the natural thermal stratification or turnover pattern.

Under compliance alternative 1, a Phase II facility could demonstrate present compliance with intake capacity requirements,

impingement reduction, entrainment reduction, and/or thermal stratification requirements, as applicable. These facilities could use existing CWIS design and construction technologies, operational measures, or restoration measures to demonstrate such compliance.

Under compliance alternative 2, an existing facility would have to select and implement design and construction technologies, operational measures, or restoration measures that satisfy the specified performance standards applicable to the facility.

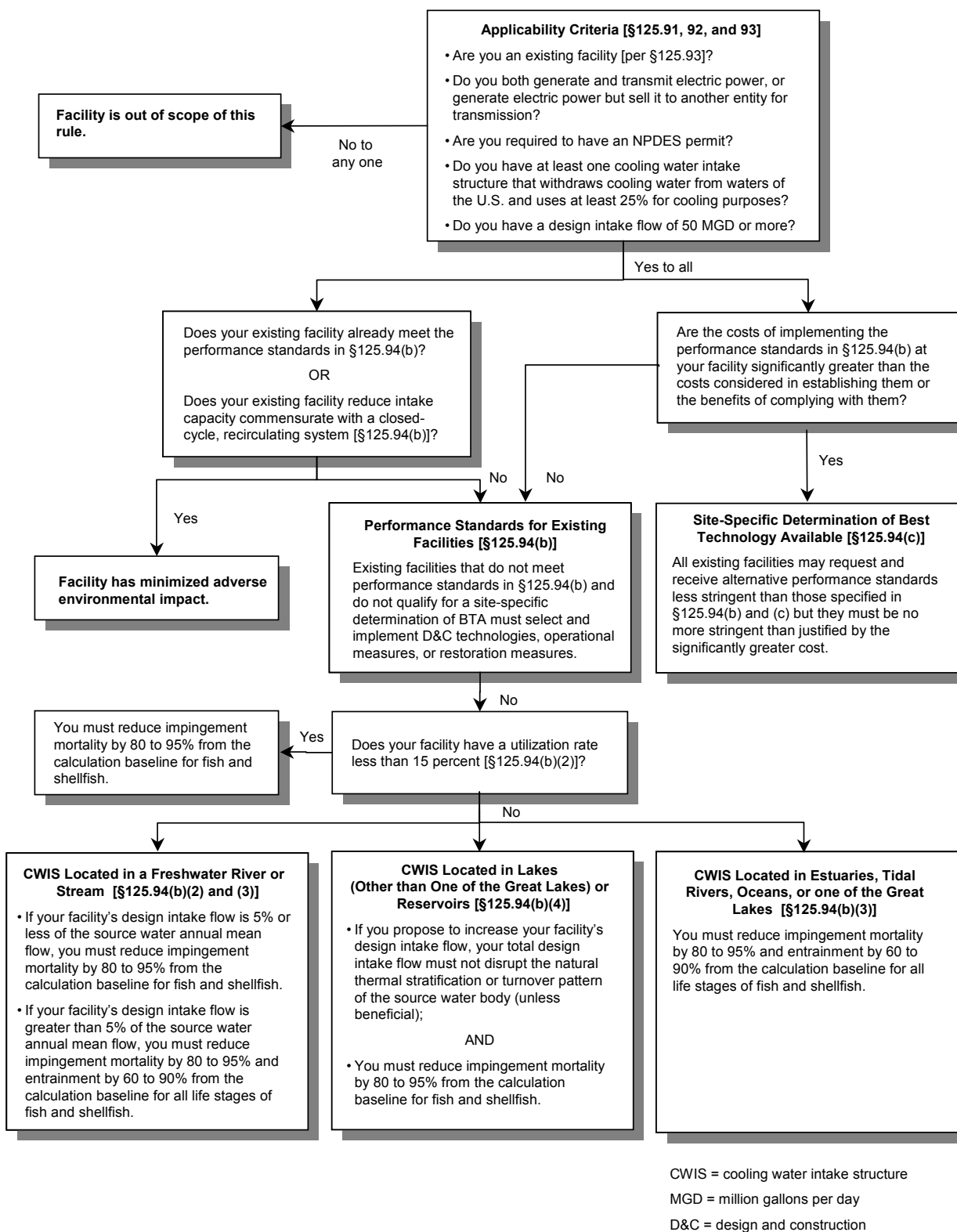
Examples of *technologies that minimize impingement and entrainment (I&E)* and that facilities might install to meet the performance standards of the proposed rule include technologies such as wet cooling towers, fine mesh screens, intake traveling screens, and Gunderbooms that exclude smaller organisms from entering the CWIS; passive intake systems such as wedge wire screens, perforated pipes, porous dikes, and artificial filter beds; and diversion and/or avoidance systems. Examples of *technologies that maximize survival of impinged organisms* include fish handling systems such as bypass systems, fish buckets, fish baskets, fish troughs, fish elevators, fish pumps, spray wash systems, and fish sills. Examples of *operational measures that minimize I&E* include seasonal flow reductions to minimize intake flow during spawning or migrating seasons. The calculation baseline against which compliance with the performance standards should be assessed is a shoreline intake with the capacity to support once-through cooling and no impingement mortality or entrainment controls.

Under compliance alternative 3, a facility must demonstrate that it meets one of two cost tests, and then the Director must make a site-specific determination of BTA for minimizing AEI. The applicant may demonstrate that the costs of compliance with the performance standards applicable to the facility (considering the facility's source water body type and proportional cooling water intake volume) would be significantly greater than (1) the costs considered by the Administrator in developing the rule standards or (2) the benefits of complying with such standards. Facilities that request a site-specific determination of BTA will have individual performance standards established by the Director at the time of permit issuance. The performance standards requested may be less stringent than those specified in the proposed rule, but they may be no less stringent than justified by the significantly greater cost.

Under all three compliance alternatives, the proposed Phase II rule allows the use of restoration measures to maintain the level of fish and shellfish in the water body, including the community structure and function, at a level comparable to that which would be achieved by the implementation of design and construction technologies and operational measures. A facility may opt to combine restoration measures with design and construction technologies and/or operational measures to achieve the desired level of fish and shellfish protection. Among other requirements, the permit applicant must submit a summary of benefits, a narrative of the proposed restoration measures, and a plan for implementing and maintaining the efficacy of the restoration effort to the Director as part of the application.

Figure A1-1 displays the framework for EPA's Proposed Section 316(b) Phase II Existing Facilities Rule.

**Figure A1-1: Section 316(b) Phase II Existing Facilities Rule Framework**



Source: U.S. EPA analysis, 2002.

## A1-4 SUMMARY OF ALTERNATIVE REGULATORY OPTIONS

EPA also considered a number of other technology-based options for regulating Phase II facilities. As in the proposed option, any technology-based options considered would allow for voluntary implementation of restoration measures by facilities that choose to reduce their intake flow to a level commensurate with the performance requirements of the option. Thus, under these options, facilities would be able to implement restoration measures that would result in increases in fish and shellfish if a demonstration of comparable performance for species of concern is made. Similarly, most technology-based options considered also would allow facilities to request alternative requirements that are less stringent than those specified, but only if the Director determines that data specific to the facility indicate that compliance with the relevant requirement would result in compliance costs significantly greater than (a) the costs EPA considered in establishing the requirement at issue or (b) the benefits of the requirement. The alternative requirement could be no less stringent than justified by the significantly greater cost. Finally, under the technology-based options considered, facilities that operate at less than 15 percent capacity utilization would, as in the proposed option, only be required to have impingement control technologies.

Other regulatory options considered by EPA include:

- ▶ (1) requiring Phase II facilities located on different categories of waterbodies to reduce intake capacity commensurate with the use of closed-cycle, recirculating cooling systems based on location and the percentage of the source waterbody they withdraw for cooling (Options 1 and 2);
- ▶ (2) requiring all Phase II facilities to reduce I&E to levels established based on the use of design and construction technologies (e.g., fine mesh screens, fish return systems) or operational measures (Option 3a);
- ▶ (3) requiring all Phase II facilities to reduce intake capacity commensurate with the use of closed-cycle, recirculating cooling systems (Option 4);
- ▶ (4) requiring all Phase II facilities to reduce their intake capacity to a level commensurate with the use of a dry cooling system (Option 5); and
- ▶ (5) requiring all Phase II facilities located on certain types of water bodies to reduce intake capacity commensurate with the use of closed-cycle recirculating cooling systems (Option 6).

Each of these alternative regulatory options is briefly described below.

### a. Intake capacity commensurate with closed-cycle, recirculating cooling systems based on waterbody type and proportion of waterbody flow (Options 1 and 2)

This option, referred to as the “waterbody/capacity-based option,” would require facilities that withdraw very large amounts of water from an estuary, tidal river, or ocean to reduce their intake capacity to a level commensurate with that which can be attained by a closed-cycle, recirculating cooling system. Under this option, EPA would group waterbodies into five categories: (1) freshwater rivers or streams, (2) lakes or reservoirs, (3) Great Lakes, (4) tidal rivers or estuaries, and (5) oceans. The following compliance requirements would apply:

- ▶ Two types of facility would have to meet standards for reducing impingement mortality and entrainment based on the performance of wet cooling towers: (1) facilities with CWIS located in a tidal river or estuary, if the intake flow is greater than one percent of the source water tidal excursion and (2) facilities with CWIS located in an ocean, if the intake flow is greater than 500 MGD. In addition, these facilities must implement and/or maintain additional I&E controls if the CWIS is located in a sensitive biological area.
- ▶ Facilities with CWIS located in an estuary or tidal river or ocean that do not exceed the intake withdrawal threshold, facilities with a CWIS located in a freshwater river or stream that exceed the intake withdrawal threshold for freshwater rivers or streams (greater than 5 percent of the source water mean annual flow), and facilities with CWIS located in one of the Great Lakes must implement and/or maintain both I&E controls.
- ▶ Facilities with a CWIS located in a freshwater river or stream that do not exceed the intake withdrawal threshold and all facilities with CWIS in a lake or reservoir, must implement and/or maintain impingement controls only. In addition, facilities with CWIS located in a lake or reservoir must not disrupt the natural thermal stratification or turnover pattern of the source waterbody unless such disruption is determined to be beneficial to fish and shellfish.

Facilities with recirculating cooling system based requirements would have the choice of complying with Track I or Track II requirements. If a facility chose to comply with Track II, then the facility would have to demonstrate that alternative technologies would reduce I&E to levels comparable to those that would be achieved with a closed-loop recirculating system



(90 percent reduction). If such a facility chose to supplement its alternative technologies with restoration measures, it would have to demonstrate the same or substantially similar level of protection.

EPA analyzed two different cases of the waterbody/capacity-based option: the first case assumes that all facilities with a recirculating cooling system based requirements would comply with Track I and install a wet cooling tower (Option 1); the second, more likely, case assumes that a percentage of the facilities with a recirculating cooling system based requirements would comply with Track II and conduct a comprehensive waterbody characterization study and install technologies other than wet cooling towers (Option 2). Under Option 1, 54 facilities are assumed to install a cooling tower; under Option 2, 33 facilities are assumed to install a cooling tower.

### **b. Impingement mortality and entrainment controls everywhere (Option 3a)**

The impingement mortality and entrainment controls everywhere option would require the implementation of technologies that reduce impingement mortality and entrainment at all Phase II facilities without regard to waterbody type and with no site-specific compliance option available. EPA would specify a range of impingement mortality and entrainment reduction that is the same as the performance requirements under the proposed rule (i.e., Phase II facilities would be required to reduce impingement mortality by 80 to 95 percent for fish and shellfish, and to reduce entrainment by 60 to 90 percent for all life stages of fish and shellfish). However, unlike the proposed option, performance requirements under this alternative would apply to all Phase II facilities regardless of the category of waterbody used for cooling water withdrawals. Like the proposed option, the percent I&E reduction under this alternative would be relative to the calculation baseline. Thus, the baseline for assessing performance would be an existing facility with a shoreline intake with the capacity to support once-through cooling water systems and no impingement or entrainment controls. In addition, as under the proposed rule, a Phase II facility could demonstrate either that it currently meets the performance requirements or that it would upgrade its facility to meet these requirements.

EPA would set technology-based performance requirements under this alternative but would not mandate the use of any specific technology. Unlike the proposed option, this alternative would not allow for the development of BTA on a site-specific basis (except on a best professional judgment basis). This alternative would not base requirements on the percent of source water withdrawn or restrict disruption of the natural thermal stratification of lakes or reservoirs. However, it would impose entrainment performance requirements on Phase II facilities located on all waterbody types including freshwater rivers or streams, and lakes or reservoirs.

Finally, under this alternative, restoration could be used, but only as a supplement to the use of design and construction technologies or operational measures. This alternative would establish clear performance-based requirements that are simpler and easier to implement than those proposed and are based on the use of available technologies to reduce AEI.

### **c. Intake capacity commensurate with closed-cycle, recirculating cooling systems for all facilities (Option 4)**

This option, referred to as the “all cooling towers option,” would require all Phase II facilities with a design intake flow of 50 MGD or more to reduce the total design intake flow to a level commensurate with that which can be attained by a closed-cycle recirculating cooling system. In addition, facilities in specified circumstances (e.g., located where additional protection is needed due to concerns regarding threatened, endangered, or protected species or habitat; or migratory, sport, or commercial species of concern) would have to select and implement design and construction technologies to minimize impingement mortality and entrainment. This option does not distinguish between facilities on the basis of the waterbody from which they withdraw cooling water. Rather, it would ensure that the same stringent controls are the nationally applicable minimum for all waterbody types.

### **d. Flow reduction commensurate with the level achieved by dry cooling systems based on waterbody type (Option 5)**

Under this option, referred to as the “dry cooling option,” two types of facilities would be required to reduce their intake capacity to a zero or nearly zero intake flow, achievable with dry cooling systems: (1) facilities with CWIS located in a tidal river or estuary, if the intake flow is greater than one percent of the source water tidal excursion and (2) facilities with CWIS located in an ocean, if the intake flow is greater than 500 MGD. All other facilities have compliance requirements similar to the waterbody/capacity-based option.

### **e. Intake capacity commensurate with closed-cycle, recirculating cooling systems for all facilities located on an estuary or tidal river or ocean (Option 6)**

Under this option, all facilities located on an estuary or tidal river or ocean must reduce intake flow commensurate with a level that can be achieved by a closed-cycle, recirculating system, regardless of proportional intake flow. Facilities with a CWIS located in one of the Great Lakes must implement and/or maintain both I&E controls. Facilities with a cooling water intake structure located in a freshwater river or stream that exceed the intake withdrawal threshold for freshwater rivers or streams (greater than 5 percent of the source water mean annual flow) must implement and/or maintain I&E controls. Facilities with a CWIS located in a freshwater river or stream that do not exceed the intake withdrawal threshold and all facilities with CWIS in a lake or reservoir, must implement and/or maintain impingement controls only. In addition, facilities with CWIS located in a lake or reservoir must not disrupt the natural thermal stratification or turnover pattern of the source waterbody unless such disruption is determined to be beneficial to fish and shellfish.

While this option was considered in the development of the proposed Phase II regulation, EPA did not estimate costs or economic impacts for this option. The remainder of the EBA will present benefits for this option, but will not discuss it in any of the chapters in *Part B: Costs and Economic Impacts*.

## **A1-5 COMPLIANCE RESPONSES OF THE PROPOSED RULE AND ALTERNATIVE OPTIONS**

Table A1-1 shows compliance response assumptions for the proposed rule and five alternative regulatory options based on each facility's current technologies installed, capacity utilization, waterbody type, annual intake flow, and design intake flow as a percent of source waterbody mean annual flow.



Table A1-1: Number of Facilities by Compliance Assumption and Regulatory Option (based on 539 sample facilities)							
Facility Compliance Assumption	Waterbody/Capacity-Based Option (Allows two tracks)		Proposed Rule (Option 3)	Impingement Mortality and Entrainment Controls Everywhere (Option 3a)	All Cooling Towers (Option 4)	Dry Cooling (Option 5)	Waterbody Based (Option 6)
	Option 1	Option 2					
Cooling tower in baseline (no action)	69	69	69	69	69	69	69
Impingement Controls Only							
<15% capacity utilization	53	53	53	53	53	53	53
Freshwater Lakes	94	94	94	0	0	94	94
Freshwater Streams and Rivers <sup>a</sup>	94	94	94	0	0	94	94
Great Lakes	0	0	0	0	0	0	0
Estuaries, Tidal Rivers, and Oceans	0	0	0	0	0	0	0
Total Impingement Controls Only	241	241	241	53	53	241	241
I&E Controls							
Freshwater Lakes	0	0	0	94	0	0	0
Freshwater Streams and Rivers <sup>a</sup>	107	107	107	201	0	107	107
Great Lakes	13	13	13	13	0	13	13
Estuaries, Tidal Rivers, and Oceans <sup>b</sup>	58	78	109	109	0	58	0
Total I&E Controls	178	198	229	417	0	178	120
Flow Reduction Technology							
Freshwater Lakes	0	0	0	0	94	0	0
Freshwater Streams and Rivers	0	0	0	0	201	0	0
Great Lakes	0	0	0	0	13	0	0
Estuaries, Tidal Rivers, and Oceans <sup>b</sup>	51	31	0	0	109	51	109
Total Flow Reduction Technology <sup>c</sup>	51	31	0	0	417	51	109
<b>Total</b>	<b>539</b>	<b>539</b>	<b>539</b>	<b>539</b>	<b>539</b>	<b>539</b>	<b>539</b>

<sup>a</sup> Options 1, 2, 3, 5 and 6: A facility located on a freshwater river or stream with a design intake flow of  $\leq 5\%$  of the source water annual mean flow will be required to install impingement controls only, while a facility with a design intake flow of  $>5\%$  of the source water annual mean flow will be required to install both I&E controls.

<sup>b</sup> Options 1, 2 and 5: A facility located on an estuary or tidal river with an intake flow  $\leq 1\%$  of the source water tidal excursion or on an ocean with an intake flow  $\leq 500$  MGD will be required to install I&E technologies. Option 1 assumes that all 51 facilities that do not meet that criteria will install flow reduction technologies commensurate with a closed-cycle recirculating system. Option 2 assumes that 31 facilities will install flow reduction commensurate with a closed-cycle recirculating system and the remaining 20 facilities will use track II (conduct a baseline characterization study) and install I&E controls. Option 5 assumes that all 51 facilities that do not meet that criteria will install flow reduction technologies commensurate with a dry cooling system.

<sup>c</sup> Options 1, 2, 4, 5 and 6: In addition to flow reduction technologies, facilities in specified circumstances (e.g., located where additional protection is needed due to concerns regarding threatened, endangered, or protected species or habitat; migratory, sport or commercial species of concern) would have to select and implement design and construction technologies to minimize impingement mortality and entrainment.

Source: U.S. EPA analysis, 2002.

## A1-6 ORGANIZATION OF THE EBA REPORT

The *Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule* (EBA) assesses the economic impacts and benefits of the proposed Phase II rule. The EBA consists of four parts. It is organized as follows:

### PART A: BACKGROUND INFORMATION

- ▶ **Chapter A1: Introduction and Overview** presents the scope, key definitions, and a summary of the proposed rule and five alternative regulatory options.
- ▶ **Chapter A2: The Need for Section 316(b) Regulation** provides a brief discussion of the industry sectors and facilities affected by this regulation, discusses the environmental impacts from operating CWIS, and explains the need for this regulatory effort.
- ▶ **Chapter A3: Profile of the Electric Power Industry** presents a profile of the electric power market and the existing utility and nonutility steam electric power generating facilities analyzed for this regulatory effort

### PART B: COSTS AND ECONOMIC IMPACTS

- ▶ **Chapter B1: Summary of Compliance Costs** summarizes the unit costs of compliance with the proposed rule and alternative regulatory options, presents EPA's assessment of compliance years, and presents the national cost of the proposed rule.
- ▶ **Chapter B2: Cost Impact Analysis** presents an assessment of the magnitude of compliance costs with the proposed Phase II rule, including a cost-to-revenue analysis at the facility and firm levels, a state-level analysis of compliance costs per household, and an analysis of compliance costs relative to electricity price projections at the North American Electric Reliability Council (NERC) level.
- ▶ **Chapter B3: Electricity Market Model Analysis** presents an analysis of the proposed rule using an integrated electricity market model. The chapter discusses potential energy effects of the proposed Phase II rule at the NERC region and national levels, and presents facility-level impacts.
- ▶ **Chapter B4: Regulatory Flexibility Analysis** presents EPA's estimates of small business impacts from the proposed Phase II rule.
- ▶ **Chapter B5: UMRA Analysis** outlines the requirements for analysis under the Unfunded Mandates Reform Act and presents the results of the analysis for this proposed rule.
- ▶ **Chapter B6: Other Administrative Requirements** presents several other analyses in support of the proposed Phase II rule. These analyses address the requirements of Executive Orders and Acts applicable to this rule.
- ▶ **Chapter B7: Alternative Options - Costs and Economic Impacts** describes the costs and economic impacts of four alternative regulatory options considered by EPA
- ▶ **Chapter B8: Alternative Options - Electricity Market Model Analysis** presents an analysis of two alternative regulatory options using an integrated electricity market model. The chapter discusses potential energy effects of the waterbody/capacity-based option (Option 1) and the all cooling towers option (Option 4) at the NERC region and national levels, and presents facility-level impacts.

### PART C: NATIONAL BENEFITS

- ▶ **Chapter C1: Introduction to the Case Studies** provides an overview of why EPA chose a case study approach for analyzing benefits, how and why the case study sites were selected, and the design of the analyses.
- ▶ **Chapter C2: Summary of Case Study Results** summarizes the findings from each case study analysis and presents

EPA's estimate of I&E nation-wide based on extrapolation from case study results.

- ▶ **Chapter C3: National Extrapolation of Baseline Economic Losses** details the methods used to extrapolate the economic value of case study losses to obtain national loss estimates and presents EPA's best estimates of national baseline economic losses.
- ▶ **Chapter C4: Benefits** presents the expected national reductions in I&E under the proposed rule and five alternative regulatory options and applies these reductions to the national baseline losses reported in Chapter C3 to obtain an estimate of national benefits attributable to section 316(b) regulation.

#### **PART D: NATIONAL BENEFIT-COST ANALYSIS**

- ▶ **Chapter D1: Comparison of National Costs and Benefits** summarizes total private costs, develops social costs, and compares total social costs to total benefits at the national level. Results are presented for the proposed rule and five alternative regulatory options.

## REFERENCES

U.S. Environmental Protection Agency (U.S. EPA). 2000. Section 316(b) Industry Survey. *Detailed Industry Questionnaire: Phase II Cooling Water Intake Structures* and *Industry Short Technical Questionnaire: Phase II Cooling Water Intake Structures*, January, 2000 (OMB Control Number 2040-0213). *Industry Screener Questionnaire: Phase I Cooling Water Intake Structures*, January, 1999 (OMB Control Number 2040-0203).

U.S. Environmental Protection Agency (U.S. EPA). 2002. *Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule*. EPA-821-R-02-003. February 2002.